



IRON STRONG

DUCTILE IRON PIPE

PERMALOY™
ABRASION RESISTANT PIPE

Permaloy™ abrasion resistant pipe is alloyed centrifugally cast Ductile iron pipe. It offers superior abrasion resistance for hydraulic or pneumatic conveyance of fly and bottom ash, mine tailings, sewage, and other abrasive materials. Permaloy I is a tin, copper, and chrome alloyed pipe possessing a minimum Brinell hardness of 280 at the inside diameter and approximately 400 at the outside diameter.

Permaloy II is a nickel, molybdenum, and chrome alloyed pipe possessing a minimum Brinell hardness of 475 at the inside diameter and approximately 550 at the outside diameter. Permaloy I and II pipe's design characteristics produce a thick-walled product possessing a high Brinell hardness inside diameter, which grows progressively harder toward the outer diameter. This characteristic results in the product continuously becoming resistant to wear the longer it is in service.

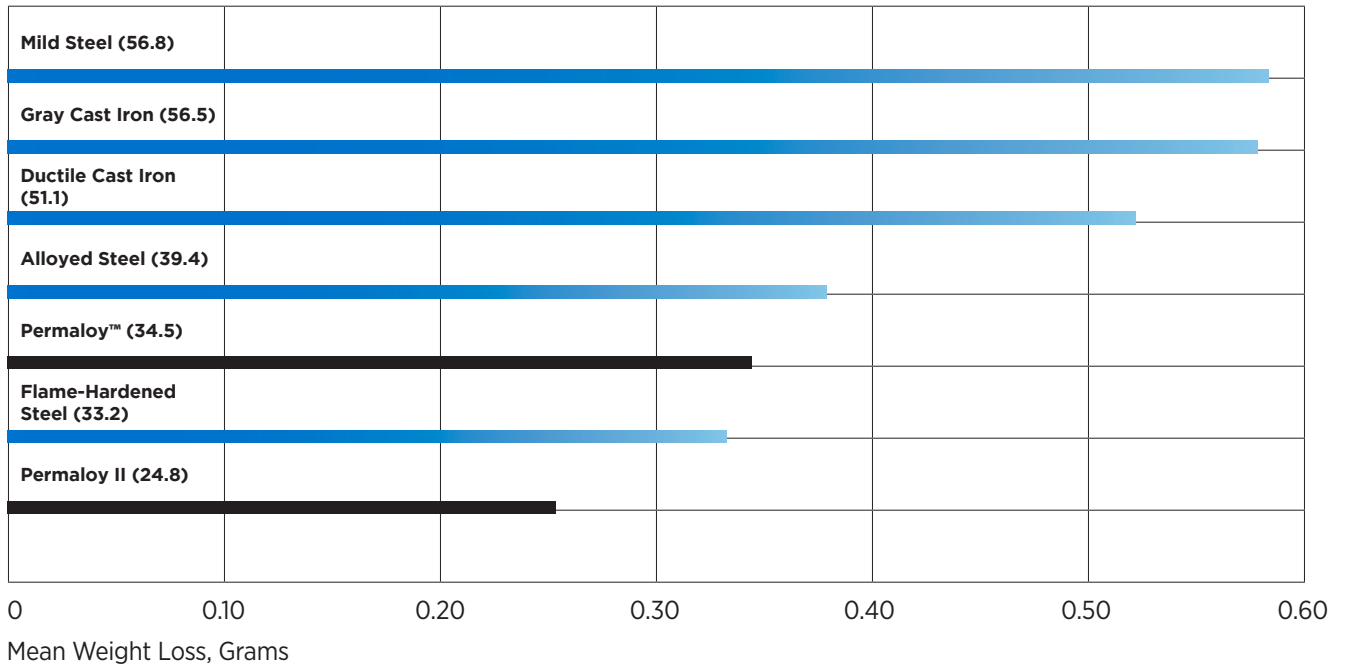
PHYSICAL PROPERTIES

The physical properties listed below for Permaloy I and Permaloy II are based upon above-ground installations and temperatures up to 800° F. According to technical data available, the effect of temperature upon these properties is very minimal. At still higher temperatures, e.g., 1200° F., Permaloy I and Permaloy II remain micro-structurally stable, resistant to oxidation, and strong enough for most above-ground installations.

MATERIAL	AVERAGE IMPACT RESISTANCE	AVERAGE TENSILE STRENGTH
Permaloy I	1.3 ft. lbs.	90,000 psi
Permaloy II	4.4 ft. lbs.	150,000 psi
Gray Cast Iron	1.0 ft. lbs.	30,000 psi
Ductile Cast Iron	7.0 ft. lbs.	60,000 psi

Pipe line abrasion and corrosion annually costs industry millions of dollars and although it is extremely difficult to predict average service life due to the many variables involved, all things being equal, the wall thickness and BHN hardness will affect the service life in any given system.

I.D. PIPE WALL EROSION RESULTS



As can be seen from this table, Permaloy I offered the best resistance to abrasion.

- Thick Wall
- Temperature and Impact Resistance
- Longer Service

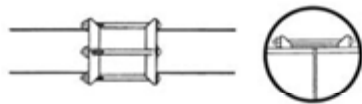
Testing and Inspection

- Microstructures are evaluated and hardness tests performed on representative pipe to ensure proper iron matrix and hardness.
- Iron analysis are closely monitored and controlled.
- Thickness tests are performed on each piece of pipe.
- Each pipe is ring gauged to ensure proper outside diameters.

JOINTS

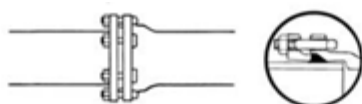
Permaloy pipe are available in plain-end, and mechanical joint (per ANSI A21.11) end connections to simplify the joining and rotating of pipe fittings.

Plain-End connected by a cast coupling

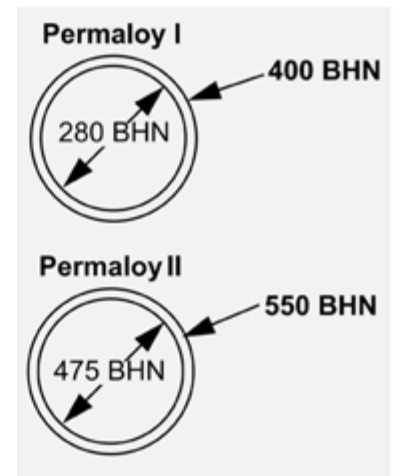


- Easy to install
- Easy to rotate
- Flexible connection

Mechanical Joint



- Easy to install
- Flexible connection



PERMALOY™ CONTINUED...

NOMINAL PIPE DATA					WEIGHTS*	
NOMINAL SIZE INCHES	END CONNECTION	(O.D.) OUTSIDE DIAMETER	NOMINAL WALL THICKNESS	MINIMUM WALL THICKNESS	18 FOOT PLAIN-END	18 FOOT MECHANICAL JOINT
4 (CD)	Plain	5.00	.48	.43	400	—
5 (CD)	Plain	6.00	.50	.50	505	—
6 (AB)	Plain	6.90	.55	.47	640	—
6 (AB)	Mech. Jt.	6.90	.55	.47	—	645
6 (CD)	Plain	7.10	.55	.50	660	—
8 (AB)	Plain	9.05	.65	.60	1000	—
8 (AB)	Mech. Jt.	9.05	.65	.60	—	1005
8 (CD)	Plain	9.30	.65	.57	1025	—
10 (AB)	Plain	11.10	.57	.51	1100	—
10 (AB)	Mech. Jt.	11.10	.57	.51	—	1105
10 (AB)	Plain	11.10	.70	.61	1330	—
10 (AB)	Mech. Jt.	11.10	.70	.61	—	1335
10 (CD)	Plain	11.40	.70	.62	1365	—
12 (AB)	Plain	13.20	.62	.56	1425	—
12 (AB)	Mech. Jt.	13.20	.62	.56	—	1435
12 (AB)	Plain	13.20	.75	.66	1705	—
12 (AB)	Mech. Jt.	13.20	.75	.66	—	1710
12 (CD)	Plain	13.50	.75	.67	1745	—
14 (AB)	Plain	15.30	.75	.67	2280	—
14 (AB)	Mech. Jt.	15.30	.75	.67	—	2010

* Weights are calculated to the nearest 5 pounds.

TOLERANCES		
OUTSIDE DIAMETER	WALL THICKNESS*	LAYING LENGTHS
6" through 12" = +/- 0.06"	6" through 12" = -0.05" + 0.08"	Plain End = 18' - 0" +/- 0.25"
14" through 16" = +/- 0.8"	10" through 12" = -0.06" + 0.09"	Flanged = 18' - 0" +/- 0.125"
	14" through 16" = -0.08" + 0.08"	Mechanical Joint = 18' - 3" +/- 3.0"
16 (AB)	Mech. Jt.	17.40

* Per ANSI A21.51-1976. Revision an additional minus tolerance of .02" shall be permitted along the barrel of the pipe for a distance not to exceed 12 inches.

Note on Ordering: We must be allowed to supply 15% of any order of plain-end pipe in 16- to 18-foot random lengths. Minimum quantities orders may apply. Larger sizes may be available. Please call for details.



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